UCRL-JC-123389 Abs

Cloud Parameterization in Global Climate Models: Evaluation with ARM Data

Joyce E. Penner and Catherine Chuang
Lawrence Livermore National Laboratory
Livermore, California

Abstract

The goal of our work is to develop and evaluate a prognostic aerosol model together with a parameterization of the effects of aerosols, acting as cloud condensation nuclei, on initial cloud droplet concentrations. This, together with global climate models which are able to treat the microphysics of clouds should allow us to improve the climate models' representation of clouds so that they may more accurately predict future climate change. Development of models capable of treating the microphysics of clouds after the initial size distribution is determined is proceeding under separate investigators within the ARM program.

The next important phase of this project is to begin testing our aerosol/cloud parameterization by using the ARM data at the SGP Site. This will be done in the following manner. First, we anticipate estimating aerosol concentrations at cloud base using data taken at the site. This, together with profile data of temperature, relative humidity, and an estimate of vertical velocity will be used to drive our parameterization of aerosol/cloud interactions and to estimate droplet concentration and effective radius. The droplet effective radius (estimated from the parameterization for number concentration together with cloud liquid water path from the microwave radiometer) will then be used to derive the top of atmosphere radiances and surface irradiances which can be compared to AVHRR satellite-derived radiances in the first instance and to SIROS-derived surface irradiances in the second instance. Our poster presentation will report on our progress to date.

This work was performed under the auspices of the U.S. Department of Energy under Contract W-7405-Eng-48.